

### REMARKS

This response is intended as a complete response to the Final Office Action dated April 1, 2008. In view of the following discussion, the Applicants believe that all claims are in allowable form.

### CLAIM REJECTIONS

A. 35 USC §103 Claims 1, 3, 4, 6, 7, 9, 10, 12-15 and 17-21

Claims 1, 3, 4, 6, 7, 9, 10, 12-15 and 17-21 stand rejected under 35 USC. §103(a) as being unpatentable over *Nishiyama* in view of Japanese Patent Application Publication No 06-243992, published September 2, 1994 to *Deguchi, et al.* (hereinafter *Deguchi*). The Applicants respectfully disagree.

Independent claims 1, 9, 10, and 19 each recite limitations not taught or suggested by any permissible combination of *Nishiyama* and *Deguchi*.

*Nishiyama* generally teaches a method for forming an insulation layer using a plasma enhanced chemical vapor deposition apparatus. (See, *Nishiyama*, English Machine Translation (EMT), pg. 1, ¶ [0001].) With respect to the apparatus, *Nishiyama* discloses a counterelectrode 15 that is equipped with RF generators 16 and 17 of two variable frequencies through two independent matching networks 18 and 19, respectively. (*Id.* at ¶ [0012].) However, and as admitted by the Examiner, *Nishiyama* fails to teach or suggest, an apparatus for matching the impedance of a pair of RF sources wherein a first match tune space defined by a first sub-circuit can be varied without affecting a second match tune space defined by a second sub-circuit, as recited in claims 1, 9, 10, and 19.

*Deguchi* teaches a plasma processing device having a matching part 14 and an RF electric power supply part 12 in which the impedance is matched by changing an oscillation frequency of output electric power on the side of the RF electric power supply part 12. *Deguchi*, however, discloses only one RF signal for one matching part and is devoid of any teaching or suggestion regarding the matching of multiple RF signals fed to a single electrode. Specifically, *Deguchi* fails to teach or suggest an apparatus for matching the impedance of a pair of RF

sources coupled to a single electrode to the impedance of a plasma in a semiconductor substrate processing chamber wherein a first match tune space defined by the first sub-circuit can be varied without affecting a second match tune space defined by the second sub-circuit, as recited in independent claims 1, 9, 10, and 19.

Therefore, *Deguchi* fails to teach or suggest a modification of *Nishiyama* that would yield an apparatus for matching the impedance of a pair of RF sources wherein a first match tune space defined by a first sub-circuit can be varied without affecting a second match tune space defined by a second sub-circuit, as recited in claims 1, 9, 10, and 19. Thus, a *prima facie* case of obviousness has not been established as the combination of the cited art fails to yield the limitations recited in the claims.

As noted in the prior Office Action response and acknowledged by the Examiner in the present Final Office Action, it is well settled law that structural elements may be defined functionally. "A patent applicant is free to recite features of an apparatus either structurally or functionally." (*In re Schreiber*, 128 F.3d 1473, 44 USPQ 2d 1429 (Fed. Cir. 1997).) "[T]here is nothing intrinsically wrong with [defining something by what it does rather than what it is] in drafting patent claims." (*In re Swinehart*, 439 F.2d 210, 212, 169 USPQ 226, 228 (CCPA 1971).) "[W]hile the claims contain numerous functional statements, these statements seem to be for the purpose of clearly defining or differentiating elements which have been positively included in the claims. We see no objection to the use of functional statements to define an element..." *In re Sherman*, 45 USPQ 532, 534 (Pat. Off. App. 1939).)

Here, as noted above as held by the courts to be permissible, any functional statements present in the independent claims are "for the purpose of clearly defining or differentiating elements which have been positively included in the claims" (e.g., the first and second sub-circuits). These "functional" limitations impose a structural difference between the present claims and the combination of cited art asserted by the Examiner. Specifically, the first sub-circuit must have a structure that allows a first match tune space defined by the first sub-circuit to be

varied without affecting a second match tune space defined by the second sub-circuit. This structure is neither taught nor suggested by the cited art.

The Examiner asserts that the apparatus taught by the combination of *Nishiyama* and *Deguchi* meets “all of the structural limitations of the claimed invention” and “would be structurally capable of performing the intended use of allowing the first match tune space defined by the first sub-circuit to be varied without substantially affecting the second match tune space defined by the second sub-circuit, by varying the shunt capacitors.” (*Final Office Action*, p. 4-5.)

However, the Applicants note that neither *Nishiyama* nor *Deguchi* teach or suggest that “the first match tune space defined by the first sub-circuit to be varied without substantially affecting the second match tune space defined by the second sub-circuit, by varying the shunt capacitors,” as asserted by the Examiner. The Examiner appears to acknowledge this and relies solely upon the Applicant’s own disclosure to support her assertion.

For example, in the Response to Arguments section of the Final Office Action, the Examiner maintains her reliance upon her asserted cogent technical reasoning to show that the structure taught by the combination of *Nishiyama* and *Deguchi* would be structurally capable of performing the function recited in the claims of allowing the first match tune space defined by the first sub-circuit to be varied without substantially affecting the second match tune space defined by the second sub-circuit by varying the variable shunt capacitor. (*Final Office Action*, p. 9, emphasis added by the Examiner.)

The Examiner only refers to paragraphs 20 and 21 of the present application to provide the reasoning for her assertion. (*Final Office Action*, p. 9.) However, the Applicants’ own teachings with respect to the operation of the presently claimed invention does not show how the combination of *Nishiyama* and *Deguchi* may operate. Specifically, the present application discusses the benefits of the present invention and not of any alleged combinations of other match circuits. As such, the operation of the present invention sheds little light on what would happen were one to combine the cited art in the manner asserted

by the Examiner, then operate it in a manner as discussed in the present application.

The Examiner appears to be taking the position that any match circuit having fixed series components and variable shunts to ground would be “structurally capable” of the tune space independence obtained by the present invention. The Applicants strongly disagree with this position and note that there is no support in the record for such a position. Firstly, as noted above, the Examiner’s reliance on the present specification goes too far, as the specification does not provide such a teaching.

Moreover, the Declaration of inventor Steven S. Shannon, filed September 27, 2007 and discussed in the previous Office Action, shows that fixed series elements and variable shunt capacitors of a dual frequency match circuit will not necessarily provide respective tune space independence. For example, paragraph 10 of the declaration notes, in part, that a match circuit having fixed series components and a variable shunt to ground does result in a tune space shift when varying the shunt capacitor. Thus, consistent with the Applicants position, and contrary to the Examiner’s reliance on the present application, there is no evidence that the combination of the cited art fails to yield the limitations of the claims. As such, merely providing the match circuits of *Nishiyama* with fixed series components and a variable shunt to ground of *Deguchi*, and varying the variable shunt capacitors as the Examiner contends does not teach or suggest, nor necessarily results in a dual frequency match circuit having tune space independence for the respective tuning circuits for each frequency signal.

In the Response to Arguments section of the Final Office Action, the Examiner contends that the Declaration is insufficient to show that the combination of *Nishiyama* and *Deguchi* fails to teach or suggest the claimed invention. Specifically, the Examiner asserts that the rejection is based on structural capability of the apparatus formed from the combination of *Nishiyama* and *Deguchi* to perform in the same manner as the claimed invention, based on user control of the variable shunt capacitors and the variable RF sources (Final Office Action, p. 11, emphasis added by the Examiner) and that the Declaration

is silent as to why the apparatus formed from the combination of *Nishiyama* and *Deguchi* would not be structurally capable of exhibiting the respective tune space independence of the claimed invention. (Final Office Action, p. 11-12, emphasis added by the Examiner.)

However, the Applicants respectfully submit that, as discussed above, there is no evidence that user control of the apparatus formed from the combination of *Nishiyama* and *Deguchi* could provide the respective tune space independence as recited in the claims. Moreover, the Applicants direct the Examiner's attention to paragraph 10 of the Declaration, referred to above, that specifically states that such user control of a match circuit having fixed series components and a variable shunt to ground that does not comport with the principles of the present invention, does result in a tune space shift when varying the shunt capacitor.

The Examiner also appears to misunderstand the Applicants' use of the phrase, "does not comport with the principles of the present invention." As used herein and in the Declaration, the phrase is intended to convey that the combination of *Nishiyama* and *Deguchi* may look similar in some respects (fixed series components and variable shunts to ground) but do not provide the tune space independence disclosed in the present application – in other words, they do not comport with the principles of the present invention.

As such, the Declaration shows that match circuits having fixed series components and variable shunts to ground that comport with the principles of the present invention will provide tune space independence, and that match circuits having fixed series components and variable shunts to ground that do not comport with the principles of the present invention will not provide tune space independence. Thus, the Declaration shows that simply providing fixed series elements and variable shunt capacitors in a dual frequency match circuit will not necessarily provide respective tune space independence, as recited in the independent claims. The Applicants maintain that it remains the Examiner's burden to show that the combination of cited art will necessarily result in tune

space independence, or that it would be obvious to further modify the cited art to do so.

Thus, the Applicants submit that the Declaration is both relevant and sufficient to show that the combination of *Nishiyama* and *Deguchi* fail to teach or suggest an apparatus for matching the impedance of a pair of RF sources wherein a first match tune space defined by a first sub-circuit can be varied without affecting a second match tune space defined by a second sub-circuit.

The Examiner further asserts that she is unable to identify any structural difference between the combination of *Nishiyama* and *Deguchi* and the claimed invention that would prevent the structural capability of *Nishiyama* and *Deguchi* from performing the same functions as the claimed invention. (*Final Office Action*, p. 12.) The Applicants counter that the Examiner has not provided any citation or reasoning, other than the Applicants own disclosure, as to why the alleged combination of *Nishiyama* and *Deguchi* would be able to meet the limitations recited in the claims. As the Applicants have already shown why the Applicants own disclosure does not show that the combination of *Nishiyama* and *Deguchi* would be able to meet the limitations of the claims, and as the Declaration shows that merely providing fixed series elements and a variable shunt to ground will not inherently produce a structural capability to meet the limitations recited in the claims, the Applicants thus submit that the burden of establishing a *prima facie* case of obviousness has not been met. Specifically, for the reasons discussed above, a *prima facie* case has not been established because the Examiner has not shown that the combination of cited art would yield a match circuit having the structural capability to provide tune space independence as recited in the independent claims.

For the reasons discussed above, the Applicants submit that the discussion provided above, alone or in combination with the Declaration, show that the combination of *Nishiyama* and *Deguchi* fails to teach or suggest an apparatus for matching the impedance of a pair of RF sources wherein a first match tune space defined by a first sub-circuit can be varied without affecting a second match tune space defined by a second sub-circuit, as recited in claims 1,

9, 10, and 19. Therefore, a *prima facie* case of obviousness has not been established because the combination of *Nishiyama* and *Deguchi* fails to teach or suggest the limitations recited in independent claims 1, 9, 10, and 19.

Thus, claims 1, 9, 10, 19, and 21, and all claims depending therefrom, are patentable over *Nishiyama* in view of *Deguchi*. Accordingly, the Applicants respectfully request that the rejection be withdrawn and the claims allowed.

C. 35 USC §103 Claim 5

Claim 5 stands rejected under 35 USC §103(a) as being unpatentable over *Nishiyama* in view of *Deguchi* as applied to Claim 1 above, and further in view of US Patent No. 6,887,339, issued May 3, 2005, to *Goodman, et al.* (hereinafter *Goodman*). The Applicants respectfully disagree.

Independent claim 1, from which the above rejected claim depends, recites limitations not taught or suggested by any combination of the cited references. The patentability of claim 1 over the combination of *Nishiyama* and *Deguchi* has been discussed above.

The Examiner cites *Goodman* to show that RF sources conventionally have a 50 Ohm output impedance. *Goodman*, however, individually or in any permissible combination with *Nishiyama* and *Deguchi* does not teach or suggest a first sub-circuit for matching the impedance of a first variable frequency RF signal generated by a first RF source to the impedance of the plasma and a second sub-circuit for matching the impedance of a second variable frequency RF signal generated by a second RF source to the impedance of the plasma... wherein the first and second sub-circuits each further comprise at least one fixed set of series components and at least one variable shunt component connected to ground, and wherein a first match tune space defined by the first sub-circuit can be varied without affecting a second match tune space defined by the second sub-circuit. Accordingly, the teachings of *Goodman* cannot be used to modify the teachings of *Nishiyama* and *Deguchi* in a manner that yields the limitations as recited in claim 1. Therefore, a *prima facie* case of obviousness

has not been established because the combination of *Nishiyama*, *Deguchi*, and *Goodman* fails to teach or suggest the limitations recited in claim 1.

Thus, claim 5 is patentable over *Nishiyama* in view of *Deguchi*, and further in view of *Goodman*. Accordingly, the Applicants respectfully request that the rejection be withdrawn and the claim allowed.

D. 35 USC §103 Claims 8 and 16

Claims 8 and 16 stands rejected under 35 USC §103(a) as being unpatentable over *Nishiyama* in view of *Deguchi* as applied to Claims 1 and 10 above, and further in view of US Patent No. 6,641,149, issued November 4, 2003, to *Suemasa, et al.* (hereinafter *Suemasa*). The Applicants respectfully disagree.

Independent claims 1 and 10, from which the above rejected claims respectively depend, recite limitations not taught or suggested by any combination of the cited references. The patentability of claims 1 and 10 over *Nishiyama* and *Deguchi* has been discussed above.

*Suemasa* teaches a plasma processing method including a process chamber having two RF power sources 122, 128, coupled through two matching devices 120, 126, to a lower electrode 106. (See, *Suemasa* Fig. 1 and accompanying text.) *Suemasa*, however, individually or in any permissible combination with *Nishiyama* and *Deguchi* fails to teach or suggest a first sub-circuit for matching the impedance of a first variable frequency RF signal generated by a first RF source to the impedance of the plasma and a second sub-circuit for matching the impedance of a second variable frequency RF signal generated by a second RF source to the impedance of the plasma... wherein the first and second sub-circuits each further comprise at least one fixed set of series components and at least one variable shunt component connected to ground, and wherein a first match tune space defined by the first sub-circuit can be varied without affecting a second match tune space defined by the second sub-circuit. Accordingly, the teachings of *Suemasa* cannot be used to modify the teachings of *Nishiyama* and *Deguchi* in a manner that yields the limitations as recited in



claims 1 and 10. Therefore, a *prima facie* case of obviousness has not been established because the combination of *Nishiyama*, *Deguchi* and *Suemasa* fails to teach or suggest the limitations recited in claims 1 and 10.

Thus, claims 8 and 16 are patentable over *Nishiyama* in view of *Deguchi*, and further in view of *Suemasa*. Accordingly, the Applicants respectfully request that the rejection be withdrawn and the claims allowed.

### **CONCLUSION**

Thus, the Applicants submit that all claims now pending are in condition for allowance. Accordingly, both further consideration of this application and its swift passage to issue are earnestly solicited.

If, however, the Examiner believes that any unresolved issues still exist, it is requested that the Examiner telephone Alan Taboada at (732) 935-7100 so that appropriate arrangements can be made for resolving such issues as expeditiously as possible.

Respectfully submitted,

June 2, 2008

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